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# Farmers' paths of experimentation: the PTD process in northern Ghana

The Association of Church Development Projects ACDEP in northern Ghana was already working with the PTD approach in the late 1980s to develop LEISA technology with farmers. This received an impetus when an ACDEP member participated in the ILEIA workshop on PTD in 1989.

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However, the research collaboration with ILEIA that started in 1995 led to the formation of a more structured Northern Ghana LEISA Working Group involving other organisations like the government extension service, local research institutes and the University for Development Studies in Tamale. These people from different disciplines and with a wide range of experience needed to reach a common understanding of PTD.

### Preparing for renewed PTD

Some training in PRA methods and an exercise in AERM were carried out during the first two years, but only in February 1997, after entering into collaboration with a new ILEIA team, did the NGLWG start to prepare in earnest to work together with farmers in LEISA assessment. We met to review the experiences gained in PTD in earlier years and to develop a common approach for the new research process planned at the pilot sites.

We recognised that PTD is meant to combine formal science and indigenous knowledge, but the initiative for collaboration comes from external stakeholders (researchers and extensionists), not from the farmers themselves. Entering collaboration means negotiating a balance of power such that outcomes are evaluated according to the interests of all stakeholders. We agreed to centre the new PTD process on building up the capacity of farmers, extension workers and researchers.

The NGLWG as a group was at the 'Getting started' stage of PTD. The farmers, however, were clearly well on their way in problem solving. We had to find out 'where the farmers were coming from' before we tried to introduce anything new. We were entering their ongoing process.

One woman and one man from each of the four communities selected in Langbensi and Sadema (two in each pilot site) joined the NGLWG members in a training workshop, during which the PTD approach was discussed and participatory tools were introduced and practised.

### Situation analysis in farmer workshops

The farmers who took part in the training served as lead persons during subsequent two-day workshops held in March 1997 in the pilot areas. The starting point for analysing the current situation was either the AERM maps drawn by local men and women in 1996 or community walks made during the workshop. Four groups (older and younger men, older and younger women) drew problem trees to clarify the causes

and effects of farming problems, listed constraints and ranked them by scoring with pebbles. All communities identified land (expressed in terms of availability and/or fertility) as the main factor limiting production. In addition, the women in Sandema identified pest control in grain storage as an important issue.

The villagers then drew a second tree, focusing on the causes and effects of problems associated with land. The causes of soil infertility included shortage of manure, tillage practices, continuously cropping the same land, limited crop rotation, sand collection, indiscriminate cutting of trees, burning of crop residues and bush fires.

### Potential solutions

During the workshops, farmers proposed some ways of improving soil fertility based on their own experience and what they had heard earlier from extensionists. Their suggestions included:

- Incorporating crop residues into the soil
- Applying chemical fertilisers
- Legume-cereal rotations or mixtures
- Applying farmyard manure or household refuse
- Sowing cover crops
- Applying ash from burnt bush land
- Controlled burning
- Planting trees.

NGLWG's Research Coordinating Committee met to discuss the farmers' proposals as well as other possible ways of improving soil fertility drawn ▶

from literature and recent field studies. Researchers had shown that soils at the sites were deficient in phosphorous and recommended that the farmers could try to test the affect of including phosphorous in organic matter as one option.

During a second set of workshops held in April 1997, NGLWG members and farmers took a closer look at soil infertility and how farmers were trying to tackle it. They observed eroded places, infertile soils, fields manured by kraaled cattle, and some of the rotations used by farmers. In each community, potential solutions were discussed and ranked.

### Drawing experimentation paths

NGLWG members were aware of their limited skills when it came to helping farmers design experiments. In previous attempts to follow a PTD approach, ACDEP staff had designed the experiments in their offices and presented them to farmers for approval. This time, the challenge was to enable the farmers to design the experiments themselves.

Starting from the basic assumption that farmers are already informal experimenters, we devoted the second day of the workshop to exploring local concepts of experimentation. First, farmers were asked to identify a local word for experimentation: they came up with *masim-nya*, which means 'try and see'. We worked with the idea of a footpath

(*sorle*): first, separate groups of men and women drew the path to their village, so that a stranger could find it. They marked important 'signposts' and difficult parts with symbols. Then we asked them to map the path of informal experimentation with a farming technology that someone in the group had recently tried in a similar way. The next step was to map the *sorle* they would take in an experiment to solve the problem of low soil fertility.

The groups presented their paths to each other and compared them. During the discussion, the facilitator probed for relevant features such as starting point, ending point and decisions that must be made along the way. This helped to bring the two designs into one, and to agree on what should be done at what point. Criteria and indicators for assessing the experiments (whether we are still on the path) were discussed, and critical times for collecting data to ascertain this were identified. Some aspects that farmers felt were important to observe are listed in Table 1.

The NGLWG reviewed the farmers' criteria and the researchers' and ILEIA's criteria for assessing the validity of LEISA techniques. An attempt was made to balance quantitative and qualitative data and scientific acceptability without putting undue stress on farmers and extension staff for data collection, yet allowing all partners to compare and analyse the results. NGLWG drew up a proposal for research protocols

**Table 1: Observations important to farmers for evaluating soil fertility amendments in cereal crops (women's suggestions marked with 'W')**

- Timing and amount of rainfall
- Tolerance to dry spells (W)
- Quantity and quality of seed
- Planting dates
- Germination (W)
- Rate of crop growth
- Rate of weed growth (W)
- Size of stalks and cobs
- Colour of leaves (W)
- Time of plant maturity
- Incidence of disease and pests
- Labour required to weed and harvest
- Yield in baskets
- Compactness of seeds on the cobs (W)
- Different uses that can be made of the crop
- Taste of the grains
- Ease of processing the grains
- Incidence of pests in storage.

that combined the interests of the various partners and brought them back to the pilot areas for discussion and revision. The treatments finally agreed on with farmers were as follows:

#### In Sandema:

- Farmyard manure only
- Farmyard manure + phosphorus
- Phosphorus only
- Household refuse only
- Household refuse + phosphorus

#### In Langbensi:

- Farmyard manure only
- Farmyard manure + phosphorus
- Phosphorus only
- Control

In Sandema, the experimental plot with five treatments was set in the middle of the field: the rest of the field served as the control. In Langbensi, a control was included in the design.

### Community-owned trials

The communities selected men and women to experiment on their behalf. In Sandema, 20 men volunteered to carry out the soil-fertility trials, while 15 women decided to experiment with bean storage (Box 1). In Langbensi, 20 men and 12 women agreed to do the soil-fertility trials.

At the beginning of the cropping season, one-day review workshops were held at each pilot site to ensure agreement on experiment design and on the roles and procedures that should be followed during implementation. The experimenting farmers and field staff were trained in data collection. The farmers provided the major inputs for the trials: land (about 100 m<sup>2</sup>), labour and seed. The NGLWG provided the phosphorus fertiliser (25kg/experimenting farmer).

The farmers observed the agronomic parameters during the growing season and informed extension staff when they start-

### Box 1 Women experiment with cowpea storage

During community meetings in Sandema to identify farming problems, the women said the biggest threat to family food security was pest damage in stored grains, especially cowpea, millet, sorghum, bambara beans and groundnuts. They drew up a list of locally available options to reduce damage. These included:

- periodic drying
- store in tight bottles and leave them in the sun
- store in pots with ash, sealed with cow dung
- store in cow dung
- store with local herbs (e.g. *kpaliok* and *titibinamagli*; scientific names unknown)
- store with neem powder or extract (solution)
- store with powder or extract of *dawadawa* (from the seed of *Parkia filioida*).

The women discussed the feasibility of these options and decided to compare ash, *kpaliok*, neem powder and neem solution. They agreed that the trial should be done with cowpea, the crop most damaged in storage. Fifteen women volunteered carry out the experiment. Each kept five small pots of cowpeas in the home: this gave a total of 75 pots (5 treatments x 15 replications, including a control).

After three months of storage and a cooking and tasting test, the women ranked the treatments according to the following previously agreed criteria:

- degree of pest infestation as measured by the number of holes
- colour of the cowpeas
- palatability.

They came to the conclusion that ash gave the best results, *kpaliok* was second best, and neem powder and solution were not very effective. They found that ash from sheanut, neem and *Parkia filioida* wood was particularly effective. This was the first time the women had systematically compared different ways of solving grain-storage problems. They were keen to continue and try out other indigenous botanicals and comparing them to ash and *kpaliok*.

Moses Appiah

ed major farm operations (for example, weeding, harvesting) that required data collection. The church development projects organised exchange visits between the experimenting farmers and the rest of the community. The owners of the research were the communities, not just the individuals experimenting on their behalf. Monitoring also involved cross-visits between the pilot areas, after which the participating farmers reported back to their communities.

Because the experimentation was supposed to provide information for validating LEISA, data for this purpose also had to be monitored. Two types of scientific analysis were planned. The laboratory analysis of soils, organic fertilisers, yields, and total nutrient input and uptake and a total farm input and output analysis in terms of labour, costs, materials and input-output flows between plots within the farm, to be done using a computer model called FARMS. Extension staff took samples for these analyses and made twice-weekly field visits to collect data.

### Farmers eager to compare results

It had been planned that the observations, measurements and analyses made by the farmers and scientists would be brought together in end-of-season assessment workshops but farmers already began comparing notes during the regular monitoring sessions. They regarded the experiments as a kind of competition and insisted that the NGLWG visit each experimental plot to see what had been achieved. Some 'non-experimenting' farmers voluntarily joined the monitoring sessions. The farmers were eager to move ahead in discussing their experiments, and not wait for the scientific analysis of results.

The NGLWG organised a two-day assessment workshop in each area. Farmers indicated that the soils treated with farmyard manure (FYM) could hold more water. When rains were poor, crops in these plots were more vigorous than in the other plots. In both pilot areas, farmers judged that FYM plus phosphorus gave the best grain yields: over twice as much as in the control plots. The second best ranking was given to treatment with FYM alone. Quantitative assessment by scientists confirmed the farmers' conclusions. However, because phosphorus must be bought and is difficult to obtain locally, the farmers found that organic manure was the best option for their situation.

Nevertheless, farmers indicated the following constraints in producing and using farmyard manure.

- limited quantity of FYM available
- poor quality of FYM
- large amount of labour needed to produce and apply FYM
- high incidence of weeds in plots treated with FYM
- difficult access to the equipment needed for producing and using FYM.

The villagers expressed satisfaction with the outcome of the assessment workshops and wanted to continue the research. It was agreed that, in the next cropping season, farmers from neighbouring communities would be invited to join the trial-monitoring visits. As farmers and extension staff complained about the time spent collecting data, especially for the FARMS model, this was scaled down.

### Continuing and extending PTD

Sustaining the PTD process and scaling it up were concerns of the NGLWG from the start of collaboration. Reports on the research were sent to the documentation centres and libraries of institutions concerned with agricultural development in northern Ghana. At each quarterly meeting of ACDEP, the Country Programme Coordinator briefed members about the farmers' research. This eventually led to plans to scale up the approach to other ACDEP member stations.

The climax of the PTD cycle was a one-week regional workshop, involving key people from the collaborating organisations, representatives of experimenting

roles and responsibilities of all partners in the PTD process.

Discussion about new experiments focused on two main problem areas: insufficient organic matter and weed control. The farmers came up with several options that could be tried out (Table 2).

Based on results of scientific studies that had been commissioned by the NGLWG during the previous year, it was agreed that cover cropping with *Mucuna*, *Callapogonium* and *Stylosanthes* spp would be included in the 1998 trials. Some farmers also wanted to include the pit compost they had started to prepare after the Burkina Faso trip (Box 2). Weed growth was included as a principal indicator to be monitored in 1998 and a weed scientist was brought in for this purpose.

In 1998, all the experiments were repeated at the pilot sites by all the original experimenting farmers. Some farmers used the compost prepared after the Burkina Faso trip as a substitute for FYM or household refuse, while others used it in addition to these. In Langbensi, seven additional farmers started experiments with cover crops.

**Table 2: Farmers' suggestions to improve the use of FYM**

Problem	Suggested research directions
1. Insufficient organic matter	a. Compost making b. Improving animal health and husbandry c. Supplementary feeding and housing d. Expanding small ruminant production
2. Weed control	a. Revamping the communal labour system b. Using leguminous cover crops c. Developing appropriate weeding tools d. Animal traction

farmers selected by their communities, and both regional and national policymakers. In addition to being a forum to further analyse and share research results, the regional workshop provided an occasion for the advocacy of LEISA and PTD, and served as a platform for re-planning the general directions of research. Afterwards, the NGLWG helped the participating farmers prepare community workshops to brief their fellow farmers. This led into planning the next PTD cycle.

### Feeding into the next PTD cycle

The community workshops in early 1998 combined the PTD phases 'Looking for things to try' and 'Designing the experiment' and were focused on the problems encountered with FYM. During the farmers' monitoring visits and assessment meetings, the communities had already asked for the number of experimenting farmers to be increased. The community workshops therefore started with reviewing the mandates, commitments,

Farmers working with other ACDEP member projects chose to address issues of particular relevance to their situations such as comparing bush-farm composting with pit composting near the home, with particular attention to water requirements and inputs for transporting organic matter and compost.

The experiments are continuing with more experience, commitment and intensity. New farmers who have joined the PTD process are being encouraged and supported as part of the ACDEP agricultural projects extension programme. In addition, the NGLWG has commissioned a study on animal health and husbandry with the intention of feeding the outcome into the farmers' research.

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## Box 2 Ghanaian farmers' excursion to Burkina Faso

An eye-opener for the experimenting farmers in northern Ghana was a visit to farmers in Burkina Faso to see how they coped with low soil fertility. The people who joined the excursion were chosen by their communities and mandated to report back. Before departure, the Country Programme Coordinator told the farmers what they would see and facilitated discussion of possible follow-up activities. The excursion team consisted of the Coordinator, four extensionists (a man and woman from each pilot site), 16 farmers (two men and two women from each of the four pilot communities), the Langbensi station manager and an interpreter.

In October 1997 they travelled to north-east Burkina Faso where vegetation is so sparse that sometimes only pure sandy soils and hard pans with scattered thorn bushes can be found. They spent a week visiting farmers who practise an eight-week pit composting of crop residues, household wastes, animal dung and chaff; the application of compost in zai (holes hacked into the soil); and the demi-lune (half-moon) method of conserving soil and water. The Ghanaians saw how the Burkinabé farmers integrate livestock and crop husbandry although they have even fewer animals than the visiting farmers and thus improve the quantity and quality of compost. They witnessed the important role of animal traction (donkeys) in the farming system. They learned that good compost does not contain weed seeds, as had been alleged by some farmers in Ghana.

The Ghanaian farmers discussed with their Burkinabé counterparts through the interpreter. The other members of the excursion team were largely silent observers. The farmers expressed amazement at what the Burkinabé had managed to achieve under even more difficult conditions than those found in northern Ghana:

*We are very much blessed and yet are complaining of poor soils. A large proportion of our soils we have even discarded as 'dead' but, to our surprise, such soils are being used here to produce something even better than we are doing on our best soils. The Burkina experience shows that we are just jokers.*

*We are not doing enough back in Ghana to improve our soils and to get more out of our sweat and toil. Yet we are in a better position [ecologically] to do better. We have to wake up. We have to tell our people what we have seen and start doing the same.*

After the trip, the NGLWG organised a one-day workshop in each pilot area. The farmers who had travelled to Burkina explained what they had seen and learnt. They were enthusiastic about the organic manuring practices of the Burkinabé, and some had already started collecting materials to construct compost pits for themselves. Their reports generated much discussion and a strong desire in other community members to have a similar experience.

The excursion to Burkina Faso exposed the farmers to new conditions and ideas, and challenged and motivated them to continue experimenting with ways of improving soil fertility with fresh zeal and commitment. Some of the experimenting farmers in Sandema and



Seen in Burkina, then tried at home in Ghana: Tying goats near the compost pit.

Langbensi decided to add compost application as a treatment in the second year of their PTD trials. From the 10 x 10m plots in which yields were measured compost could result in a grain yield three times higher than from the control plot and also considerably higher than other treatments. Other farmers in the community who had not travelled to Burkina started to try out and adapt composting techniques on their own.

A number of initiatives arose after the farmers' assessment of the compost trial. With the greater appreciation of the value of compost, some farmers started to experiment with tying goats near to the compost pits. One farmer went as far as investing in a donkey cart, so that he could bring the compost to his remoter fields as well. Two farmers, on their own initiative, started a trial to compare the use of chemical fertiliser and the use of compost.

**Malex Alebikiya**



*Experimenting with composting near homestead.*